

SUPPORT FOR THE AMENDMENTS

Claims 2, 4, 8, 14-15, 22-23, 30-33, 35, 48, 50-60, and 62-64 were previously cancelled.

Claims 1, 9, 11, 17, 19, 21, 47, 49, and 61 have been amended.

Support for each amended Claim is found at the originally filed claims and throughout the originally filed specification.

No new matter is believed to have been added.

REMARKS

Claims 1, 3, 5-7, 9-13, 16-21, 24-29, 34, 36-47, 49, 61, and 65-70 are currently pending in this application.

Applicants acknowledge Examiner Cordray's indication that Claims 69 and 70 are allowable.

The objection to Claim 11 is obviated by amendment as suggested by the Examiner. Withdrawal of this ground of objection is requested.

The indefiniteness rejection of Claims 1, 3, 5-7, 9-13, 16-21, 24-29, 34, 36-47, 49, 61, and 65-70 is obviated in part by amendment and traversed in part. :

Applicants have amended the claims based on the Examiner's suggestions to address each rejection with the exception of the paragraph bridging pages 3-4 of the Office Action mailed February 3, 2009, related to the quantity of moles. In response to the Examiner's alleged uncertainties, Applicants submit that it is clear from the specification and the claims

that the mole quantity refers to moles implemented in formation of the reaction product.

Accordingly, no amendment is believed to be necessary.

Withdrawal of the indefiniteness rejection is respectfully requested.

The rejections of: (a) Claims 1, 3, 5-7, 9-13, 16-21, 37-45, 67, and 68 under 35 U.S.C. §103(a) over Passaretti (US 5,043,017) as evidenced by Laurila-Lumme (US 6,623,599) and Encarta Encyclopedia "Limestone (mineral)"; (b) Claim 21 under 35 U.S.C. §102(b) over Passaretti; (c) Claims 24-28, 34, 36, 47, 49, 61, 65, and 66 under 35 U.S.C. §103(a) over Passaretti (US 5,043,017) in view of Brown (US 5,676,746) and the "papermaking process described in the instant specification as known in the art; (d) Claims 29 and 46 under 35 U.S.C. §103(a) over Passaretti (US 5,043,017) in view of Holloway (US 3,002,940), are respectfully traversed.

At the outset, Applicants respectfully submit that any subject matter in Passaretti in which a chelating agent, such as sodium hexametaphosphate, is employed is not relevant to the presently claimed invention. As Passaretti correctly states, the presence of a chelating agent ensures that the pH remains acidic (Passaretti, Column 6, lines 11-13). In other words, a pH of greater than 7.5 is not reached (the examples of Passaretti are also referenced for supporting that pH values remain acidic when a chelating agent is employed). Reaching a final pH in the basic range is an essential feature of the presently claimed invention that is not disclosed or suggested by Passaretti. Thus, no claim of the claimed invention can be anticipated by Passaretti, including Claim 21. Further, for the reasons that follow, the claimed invention is not even obvious in view of Passaretti even when combined with the cited secondary references.

In view of the foregoing, Applicants submit that the only disclosure in Passaretti that is germane to the claimed invention is those passages describing comparison systems without

chelating agents. Moreover, it should be noted that the claimed invention implement GCC, and not PCC, since only GCC serves to provide the desired bulking effect referenced in the present application. Accordingly, only Column 5, line 56 to Column 6, line 2 of Passaretti and the aspects of Example 4 referencing systems without the chelating agent (notably the curve entitled "Ground Limestone, 2% H<sub>3</sub>PO<sub>4</sub>" of Figure 4) could properly be considered "relevant" to the claimed invention.

The Examiner indicates that the process of Passaretti comprises "adjusting the pH of a slurry of CaCO<sub>3</sub> to 8.0 using CO<sub>2</sub>". With this allegation, it appears that the Examiner is referring to Column 6, line 45-46 of Passaretti, where the pH of PCC slurries is adjusted, by addition of CO<sub>2</sub>, before performing the experiments of the examples, i.e. prior to any acid addition. However, this section of Passaretti refers to PCC, not GCC, since indeed PCC slurries tend to be more highly alkaline than GCC slurries and adding gaseous CO<sub>2</sub> would serve to decrease the initial pH. But, this disclosure is not easily imputable upon GCC.

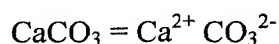
Applicants specifically note that Passaretti disclose: "When phosphoric acid is added to calcium carbonate, initially the pH of the slurry is lowered to approximately 5.0. However, within a few minutes of agitation, the pH rises to 8.0. The species that are believed to be formed when the phosphoric acid is added to calcium carbonate are Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>, CaHPO<sub>4</sub> and Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>. These three species are in equilibrium with one another, however, their solubilities decrease in the order Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> > CaHPO<sub>4</sub> > Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>. When CaHPO<sub>4</sub> forms, it precipitates out of solution which pushes the equilibrium towards its formation. Eventually all the phosphoric acid is converted to CaHPO<sub>4</sub> or Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, calcium carbonate disassociates and the pH rises. Brushite, CaHPO<sub>4</sub>, can be detected in the samples via powder x-ray diffraction."

Passaretti never discloses the formation of gaseous CO<sub>2</sub>. The formation of gaseous CO<sub>2</sub> in an acid/CaCO<sub>3</sub> system is indeed generally accompanied by an increase in pH since the

formation of CO<sub>2</sub> implies the consumption hydrogen ions. However, detailed below, the formation of carbonate intermediates prior to any formation of CO<sub>2</sub> is also associated with a pH rise, such that it is not because the pH increases that gaseous CO<sub>2</sub> is necessarily formed.

The examiner alleges that the "formation of gaseous CO<sub>2</sub> when CaCO<sub>3</sub> dissociates in water is basic chemistry". We would respectfully point out that the chemical equilibria established to reach the formation of gaseous CO<sub>2</sub> are, to the contrary, rather complex.

In an aqueous environment, calcium carbonate is essentially insoluble.



Hydrogen ions resulting from the natural, slight dissociation of water, and any hydrogen ions introduced, can react with carbonate anions as follows:

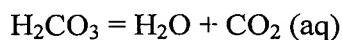


Thus, the above equation leads to the consumption of a hydrogen ion, implying a pH increase without formation of gaseous CO<sub>2</sub>.

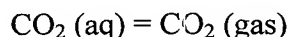
The monohydrogen carbonate ion formed can then react with a second hydrogen ion as follows. Again, this step will imply a pH increase without formation of gaseous CO<sub>2</sub>.



Dihydrogen carbonate can then dissociate to form water and aqueous CO<sub>2</sub>.



Finally, aqueous CO<sub>2</sub> can become gaseous CO<sub>2</sub>.



Quantities of the adducts, competing reactions due to other species present, temperature and time play a role in determining which of the species will be present in a system. It is not at all necessarily so that because a given quantity of acid is added to a calcium carbonate slurry, that conditions will be such that CO<sub>2</sub> gas is formed.

The mandatory presence of gaseous CO<sub>2</sub> represents a first fundamental difference between the presently claimed invention and the disclosure of Passaretti. As CO<sub>2</sub> is not mandatory in Passaretti, it is not true that the product resulting from certain sections of Passaretti will comprise the reaction product of CaCO<sub>3</sub> and gaseous CO<sub>2</sub>.

Moreover, even when Passaretti provide a disclosure where chelating agents are employed, Column 4, lines 1-4 indicates that the chelating agent reduces the solubility of the surface of CaCO<sub>3</sub>, such that the probability of forming gaseous CO<sub>2</sub> on addition of an acid would be lessened further by the presence of the chelating agent.

Figure 4 of Passaretti refers to the addition of 2% H<sub>3</sub>PO<sub>4</sub>, based on the dry weight of carbonate, to a calcium carbonate slurry. In the best of cases, if full dissociation of the phosphoric acid leading to the release of 3 hydrogen ions is considered, which Applicants submit is not necessarily the case and dependent on similarly complex equilibria, the maximum number of moles H<sub>3</sub>O<sup>+</sup> on moles carbonate in their system would be calculated as follows:

$$\begin{aligned} 2\% \text{ H}_3\text{PO}_4 \text{ on CaCO}_3 &= 2 \text{ g H}_3\text{PO}_4 / 100 \text{ g CaCO}_3 = [(2 \text{ g}) / (98 \\ &\text{g/mol H}_3\text{PO}_4)] / [(100 \text{ g}) / (100 \text{ g/mol CaCO}_3)] = 0.02 \text{ mol H}_3\text{PO}_4 / \\ &\text{mol CaCO}_3 = 0.06 \text{ mol H}_3\text{O}^+ / \text{mol CaCO}_3 \end{aligned}$$

The mole quantity of H<sub>3</sub>O<sup>+</sup> or of H<sub>3</sub>O<sup>+</sup>-ion providers relative to the moles of CaCO<sub>3</sub> of between 0.1 and 2 represents a second fundamental difference between the claimed invention and Passaretti.

The phosphoric acid quantity of up to 6% in Passaretti is not relevant since this range is only provided for in the case where a chelating agent is also employed.

Applicants further submit, contrary to the allegation of the examiner, obtaining a high surface area product is not simply a question of beginning with a high surface area calcium carbonate. It is among the advantages of the claimed technology that high SSA values may be achieved, even based on a starting material of low SSA.

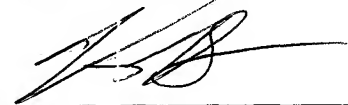
Thus, for the foregoing reasons, the claimed invention would not be obvious in view of Passaretti. Applicants further submit that none of Laurila-Lumme (US 6,623,599), Encarta Encyclopedia "Limestone (mineral)", Brown (US 5,676,746), the "papermaking process described in the instant specification as known in the art", or Holloway (US 3,002,940) compensate for the aforementioned deficiencies in the disclosure of Passaretti. As such, even in view of the combination of Passaretti with these other cited references, the claimed invention would not be obvious.

Applicants submit the present application is now in condition for allowance.

Early notification to this effect is earnestly solicited.

Respectfully submitted,

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